

Patent Claims

1. A device for detecting and locating objects comprising

a 3-D camera for recording three-dimensional situation images of a space which is to be monitored;

5 first means for evaluating the three-dimensional situation images by means of suitable object detection methods for determining an object which is present in the space which is to be monitored, and for determining the position of the object in the space;

10 a 2-D camera for recording two-dimensional situation images of that region of the space which is to be monitored, in which the position of the object has been determined; and

second means for evaluating the two-dimensional situation images by means of suitable object detection methods for redetermining the object which is present in the space which is to be monitored.

- 15 2. A device for detecting and locating objects comprising

a 3-D camera for recording three-dimensional situation images of a space which is to be monitored;

20 first means for evaluating the three-dimensional situation images by means of suitable object detection methods for determining an object which is present in the space which is to be monitored, and for determining the position of the object in the space;

a 2-D camera for recording two-dimensional situation images of the space which is to be monitored; and

25 second means for evaluating a specific region of the two-dimensional situation images by means of suitable object detection methods for redetermining the object which is present in the space which is to be monitored, the specific region corresponding to the region of the space in which the position of the object has been determined.

3. The device as claimed in claim 1 or 2, wherein the first means for evaluating the three-dimensional situation images and the second means for evaluating the two-dimensional situation images are implemented in a common processor unit.
- 5 4. The device as claimed in one of claims 1 to 3, wherein the 3-D camera and the 2-D camera are arranged directly adjacent to one another.
5. The device as claimed in claim 4, wherein the 3-D camera and the 2-D camera are arranged in a common housing.
- 10 6. The device as claimed in one of claims 1 to 5, wherein the 3-D camera and the 2-D camera operate in the same spectral region.
7. The device as claimed in claim 6, comprising a light source for illuminating the space which is to be monitored with light of a wavelength which is contained in the spectral region.
- 15 8. The device as claimed in one of claims 6 or 7, wherein the spectral region comprises an infrared region.
9. The device as claimed in claim 6, wherein the 3-D camera, the 2-D camera and the light source are arranged in a common housing.
10. A method for detecting and locating objects, comprising the steps:
 - 20 a) recording a first, three-dimensional situation image of a space which is to be monitored by means of a 3-D camera,
 - b) evaluating the first, three-dimensional situation image by means of suitable object detection methods for determining an object which is present in the space which is to be monitored, and for determining the position of the object in the space;
 - 25 c) recording a second, two-dimensional situation image of a specific region of the space which is to be monitored by means of a 2-D camera, the specific region corresponding to the region of the space in which the position of the object has been determined;

- d) evaluating the second, two-dimensional situation image in order to redetermine the object which is present.

11. A method for detecting and locating objects, comprising the steps

- 5 a) recording a first, three-dimensional situation image of a space which is to be monitored by means of a 3-D camera,
- b) evaluating the first, three-dimensional situation image by means of suitable object detection methods for determining an object which is present in the space which is to be monitored, and for determining the position of the object in the space;
- 10 c) recording a second, two-dimensional situation image of the space which is to be monitored by means of a 2-D camera;
- d) evaluating a specific region of the second, two-dimensional situation image in order to redetermine the object which is present, the specific region corresponding to the region of the space in which the position of the object has been determined.
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12. The method as claimed in claim 10 or 11, wherein the 3-D camera and the 2-D camera operate in the same spectral region.

13. The method as claimed in claim 12, comprising the step of illuminating the space which is to be monitored with light of a wavelength which is contained in the spectral region.

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14. The method as claimed in one of claims 12 or 13, wherein the spectral region comprises an infrared region.

15. A method for controlling a restraint system in a vehicle, comprising the steps:

- 25 a) determining an object and the position of said object in the region of a vehicle seat according to a method as claimed in one of claims 10 to 14,

- b) generating a control signal which is specific to the type and position of the object which has been determined and transmitting the control signal to a control unit of the restraint system;
 - c) selecting a suitable function mode of the restraint system on the basis of the control signal which has been transmitted.
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16. The method as claimed in claim 15, wherein the object comprises a child's seat.

17. The method as claimed in claim 15, wherein the object comprises the head of a vehicle occupant.

10 18. The method as claimed in claim 17, wherein the generation of a control signal comprises the calculation of a height of a torso of the vehicle occupant on the basis of the position of the head.

19. A method for avoiding accidents in a vehicle, comprising the steps:

- a) determining an object and the position of said object in the region of an area surrounding the driver according to a method as claimed in one of claims 10 to 14,
 - b) initiating suitable measures if the determined position of the object potentially counteracts safe driving of the vehicle.
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20. The method as claimed in claim 19, wherein the object comprises a body part of the driver and wherein the suitable measures are initiated if the position of the body part is determined in a region which is associated with an inappropriate body posture for driving the vehicle.

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21. The method as claimed in claim 19, wherein the object comprises an item, and wherein the suitable measures are initiated if the position of the item is determined in a field of vision of the driver.

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22. The method as claimed in one of claims 19 to 21, wherein the initiation of corresponding measures comprises the generation of a visual or audible warning signal and/or the triggering of an emergency brake system and/or

the recording of the driver's behavior and/or the selection of a suitable function mode of the restraint system.

23. A use of a device as claimed in one of claims 1 to 9 in the control a restraint system in a vehicle, wherein the restraint system is switched to a suitable function mode in accordance with the type of the object which is determined and its position in the passenger compartment of the vehicle.

24. The use of a device as claimed in one of claims 1 to 9 in the control a precrash system, wherein suitable safety measures are initiated in accordance with the type of the object which is determined and its position in the area outside the vehicle.

25. The use of a device as claimed in one of claims 1 to 9 in the control of an anti-theft warning system in a vehicle.